

**CLAIMS**

What is claimed is:

- 5           1.     An implantable device, comprising:  
            an implantable housing;  
            a plurality of implantable electrodes coupled to the housing and configured for  
sensing cardiac electrical activity;  
            detection circuitry provided in the housing and coupled to at least some of the  
10     plurality of electrodes, the detection circuitry producing a cardiac electrical signal in  
response to the sensed cardiac electrical activity;  
            an implantable sensor configured to sense movement of a heart and produce  
a sensor signal in response to the sensed heart movement;  
            sensor circuitry provided in the housing and coupled to the sensor, the sensor  
15     circuitry configured to produce an audio signal in response to the sensor signal;  
            memory provided in the housing and coupled to the detection circuitry and  
sensor circuitry, the memory configured to store the audio signal and the cardiac  
electrical signal;  
            a controller provided in the housing and coupled to the memory, detection  
20     circuitry, and sensor circuitry; and  
            communications circuitry provided in the housing and coupled to the  
controller, the communications circuitry configured to telemeter the cardiac electrical  
signal and the audio signal to a patient-external device.

2. The device of claim 1, wherein the sensor comprises an accelerometer.

3. The device of claim 1, wherein the sensor is configured to sense pressure waves produced by the heart movement.

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4. The device of claim 1, wherein the sensor comprises a piezoelectric transducer.

5. The device of claim 1, wherein the sensor comprises a microphone.

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6. The device of claim 1, wherein the sensor is situated in or on the housing.

7. The device of claim 1, wherein the sensor is provided in or on a lead.

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8. The device of claim 1, wherein at least one of the plurality of electrodes is configured for subcutaneous, non-intrathoracic placement.

9. The device of claim 1, wherein at least one of the plurality of electrodes is configured for intrathoracic placement.

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10. The device of claim 1, wherein at least one of the plurality of electrodes is disposed in or on the housing.

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11. The device of claim 1, wherein at least one of the plurality of electrodes is supported by a lead configured for subcutaneous, non-intrathoracic placement, the lead coupling the at least one of the plurality of electrodes to the housing.

12. The device of claim 1, further comprising energy delivery circuitry coupled to the controller and at least some of the plurality of electrodes, the energy delivery circuitry configured to deliver a cardiac therapy.

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13. The device of claim 12, wherein the cardiac therapy comprises a cardiac pacing therapy.

14. The device of claim 12, wherein the cardiac therapy comprises a cardiac defibrillation therapy.

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15. The device of claim 1, further comprising a patient actuatable trigger configured to communicate a trigger signal to the controller via the communications circuitry, the controller initiating storing of the cardiac electrical signal and the audio signal in the memory in response to the trigger signal.

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16. The system of claim 1, wherein the patient-external device further comprises a storage media to store the cardiac electrical signal and the audio signal telemetered from the patient-implantable device.

17. A medical system, comprising:  
a patient-implantable device, comprising:  
a housing;  
a plurality of electrodes coupled to the housing and configured for  
5 sensing cardiac electrical activity;  
detection circuitry provided in the housing and coupled to at least some  
of the plurality of electrodes, the detection circuitry producing a cardiac electrical  
signal in response to the sensed cardiac electrical activity;  
a sensor configured to sense movement of a heart and produce a  
10 sensor signal in response to the sensed heart movement;  
sensor circuitry provided in the housing and coupled to the sensor, the  
sensor circuitry configured to produce an audio signal in response to the sensor  
signal;  
memory provided in the housing and coupled to the detection circuitry  
15 and sensor circuitry, the memory configured to store the audio signal and the cardiac  
electrical signal;  
a controller provided in the housing and coupled to the memory,  
detection circuitry, and sensor circuitry; and  
communications circuitry provided in the housing and coupled to the  
20 controller, the communications circuitry configured to telemeter the cardiac electrical  
signal and the audio signal; and  
a patient-external device comprising:  
patient-external communications circuitry configured to receive the  
cardiac electrical signal and the audio signal telemetered from the patient-  
25 implantable device; and

a user interface coupled to the patient-external communications circuitry, the user interface configured for providing a visual output representative of the cardiac electrical signal and an audio output representative of the audio signal.

5           18.    The system of claim 17, wherein the user interface is configured for providing a visual output representative of the audio signal and an audio output representative of the cardiac electrical signal.

10           19.    The system of claim 17, wherein the user interface comprises a display configured to display a representation of one or both of the cardiac electrical signal and the audio signal.

15           20.    The system of claim 17, wherein the user interface comprises a display configured to display one or both of textual and graphical information associated with one or both of the cardiac electrical signal and the audio signal.

            21.    The system of claim 17, wherein the user interface comprises an audio output device configured to broadcast the audio signal.

20           22.    The system of claim 17, wherein the cardiac electrical signal and the audio signal are telemetered from the patient-implantable device to the patient-external device in response to a user request.

25           23.    The system of claim 17, wherein the cardiac electrical signal and the audio signal are telemetered from the patient-implantable device to the patient-external device in response to a request by the patient-external device.

24. The system of claim 17, wherein the cardiac electrical signal and the audio signal are telemetered from the patient-implantable device to the patient-external device in real-time.

5        25. The system of claim 17, wherein the patient-external device further comprises a storage media to store the cardiac electrical signal and the audio signal telemetered from the patient-implantable device.

10       26. The system of claim 17, further comprising a server communicatively coupled to one of the patient-implantable device and the patient-external device.

27. The system of claim 17, further comprising a server communicatively coupled the patient-implantable device and the patient-external device.

15       28. The system of claim 17, further comprising a server communicatively coupled to the patient-implantable device and the patient-external device, wherein the cardiac electrical signal and the audio signal are telemetered from the patient-implantable device to the server and communicated from the server to the patient-external device.

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29. The system of claim 17, further comprising a server communicatively coupled to the patient-external device, wherein the cardiac electrical signal and the audio signal are telemetered from the patient-implantable device to the patient-external device and communicated from the patient-external device to the server.

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30. The system of claim 17, wherein at least one of the patient-implantable device and patient-external device provides a time correlation between the cardiac electrical signal and the audio signal.

5           31. The system of claim 30, wherein the user interface comprises:  
a speaker configured to broadcast the audio signal; and  
a display configured to display a representation of the cardiac electrical signal and indicia indicative of the time correlation.

10           32. A method, comprising:  
sensing, from within a patient, movement of a heart and producing a sensor signal in response to the sensed heart movement;  
producing, within the patient, an audio signal using the sensor signal;  
detecting, within the patient, cardiac electrical activity and producing a  
15 cardiac electrical signal in response to the detected cardiac electrical activity;  
storing, within the patient, the sensor signal and the cardiac electrical signal; and  
telemetering the sensor signal and cardiac electrical signal to a patient-external location.

20           33. The method of claim 32, wherein the sensor signal and cardiac electrical signal are telemetered to the patient-external location in response to a trigger signal generated by a patient-actuated device.

25           34. The method of claim 32, wherein the sensor signal and cardiac electrical signal are telemetered to a patient-external system in response to a trigger signal generated by the patient-external system.

35. The method of claim 32, wherein the sensor signal comprises an accelerometer signal.

5 36. The method of claim 32, wherein the sensor signal comprises a piezoelectric transducer signal.

37. The method of claim 32, wherein the sensor signal comprises a microphone output signal.

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38. The method of claim 32, wherein storing comprises time correlating the audio signal and the cardiac electrical signal.

15 39. The method of claim 32, wherein detecting comprises detecting the cardiac electrical activity intrathoracically.

40. The method of claim 32, wherein detecting comprises detecting the cardiac electrical activity from one or more subcutaneous, non-intrathoracic locations.

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41. The method of claim 32, further comprising broadcasting the audio signal and displaying a representation of the cardiac electrical signal.

25 42. The method of claim 32, further comprising communicating the audio signal and the cardiac electrical signal to a server system.



43. The method of claim 32, further comprising telemetering the detected sensor signal and cardiac electrical signal in real-time.

5 44. An implantable device, comprising:  
means for detecting a cardiac electrical signal;  
means for detecting cardiac non-electrophysiologic activity transduceable to an audio signal;  
means for storing the cardiac electrical signal and the audio signal within a patient; and  
10 means for communicating the cardiac electrical signal and the audio signal to a patient-external location.

15 45. The device of claim 44, further comprising means for playing back the cardiac electrical signal and the audio signal.

46. The device of claim 44, further comprising means for concurrently displaying a representation of the cardiac electrical signal and broadcasting the audio signal.

20 47. The device of claim 44, further comprising means for concurrently displaying a representation of the detected cardiac electrical signal and broadcasting the detected audio signal in real-time.

25 48. The device of claim 44, further comprising means for providing server access to the cardiac electrical signal and the audio signal.